Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division

ENCLOSURE 2

COMMENTS

Final Corrective Measure Study/Feasibility Study
Operable Unit 1, 881 Hillside Area
Rocky Flats Environmental Technology Site

April 11, 1995

Colorado Department of Public Health and Environment,
Hazardous Materials and Waste Management Division

COMMENTS

Final CMS/FS Report, Rocky Flats Environmental Technology Site
Operable Unit 1, 881 Hillside Area, April 11, 1995

General Comments

Comment 1:

Groundwater model - As with all models, assumptions are required and a certain degree of uncertainty results from those assumptions. Section 4.0 states that, "the steady-state model assumes the source of contamination remains during the period of remediation." After the remediation is performed, the model assumes complete source removal and predicts that a RCRA performance monitoring system would be needed for 10 years after completion. This approach however, is not an accurate representation of the alternatives included in the Final CMS/FS. As stated in the document, Alternative 3 and 2 (SVE with and without thermal enhancement, respectively) may not be completely effective and are highly dependant on the location of the SVE and extraction wells. Likewise with Alternative 4 (Hot Air Injection with Mechanical Mixing) and Alternative 5 (Soil Excavation with Groundwater Pumping), both should provide a large degree of permanence if the primary contaminant source is fully remediated. Again, this assumption is highly dependent upon the nature and extent of the DNAPL. The model's assumption that the source has been completely removed may be appropriate for Alternative 5 but appears to be relatively suspect for Alternatives 2-4.

For issues where the model's predictions are either not accurate or too overconservative to be of value, RFETS representatives must use best engineering judgement, taking into account the history and tendencies of the 881 Hillside along with the rationale for their decisions. For example, the model's 10 year prediction for continued operation of the French Drain would only appear to be accurate for Alternative 5. If as the document implies, the model is highly overconservative, then the 10 year prediction may be appropriate for Alternatives 2-4 but would then likely be longer than necessary for Alternative 5. In order for the Final CMS/FS to be of adequate value, the groundwater modeling predictions must be evaluated and qualified with not only physical data but also with sound engineering judgement.

It is imperative in the Final CMS/FS to identify where the model is and is not useful. An additional 3 years of groundwater monitoring is proposed to ensure long-term effectiveness. It is unclear to the Division what the 3 year proposal is based on. Engineering judgement or modeled prediction?

Comment 2:

Point of Compliance - As previously identified in comment #3 to DOE's Response and Resolution to our comments of the Draft Final CMS/FS Report, the Final CMS/FS must identify all ARARs for OU1 and their designated point of compliance (POC). As stated in the document, "Compliance with 6 CCR 1007-3, Section 264.90 and 264.101 of the State RCRA program is required. Compliance with either the RCRA

definition of POC or the State groundwater regulatory definition, will depend upon the selection of a POC location by EPA, CDPHE, and DOE." Although the document may not need to determine the POC for OU1, the Final CMS/FS must clearly identify all ARARs and their designated POCs, including which ARARs and/or POCs would need to be changed or waived in order for the alternative to meet the requirements. Please see general comment #3 for the Division's recommendation for inclusion of POCs in the Final CMS/FS.

Comment 3:

Compliance with ARARs - For several of the alternatives analyzed in Section 4.0, the document states that ARARs should or would probably be complied with. This is unacceptable. The Final CMS/FS must be detailed enough to identify the ARARs and determine each alternative's ability to comply with its respective ARARs. If an alternative can not meet any or all ARARs, the CMS/FS must identify which ARAR(s) must be waived. If an alternative does not meet ARARs, without a waiver for these ARARs, the alternative can not be selected.

Comment 4:

Wetland and riparian areas - The Final CMS/FS identifies the potential for implementation of Alternatives 2-5 to disrupt wetland and riparian habitats. It is unclear to the Division what areas of OU1 are considered wetland and riparian habitats. The document must not only define what areas of OU1 are either wetland and/or riparian but must also define mitigation measures that would likely be needed to comply with species protection requirements. The Division is unaware of any finite decisions requiring species protection requirements and if so, wouldn't some type of barrier or fence be adequate?

Comment 5:

OU 2 GAC unit transfer - The document states that it is expected that the GAC unit from OU2 will be added and will make it possible for the system to effectively treat CCl_4. In order to effectively evaluate all alternatives utilizing the French Drain, both in terms of treatment efficiency and cost, a definite commitment should be included. If a definite commitment is not possible, then the language regarding the OU2 GAC unit transfer should be deleted.

Specific Comments:

Comment 1:

Section 4.1.2, page 4-5 - Key ARARs must also include Part 100 of the Colorado Hazardous Waste Regulations.

Comment 2:

Section 4.1.2, page 4-8 - The CMS/FS identifies riparian corridors such as those found along Woman Creek as habitat requirements for the mouse. If the Preble's meadow jumping mouse becomes listed on the Federal Endangered Species List, what requirements would impact the alternatives identified in the Final CMS/FS? What areas of OU1 are considered riparian corridors? Please clarify any alternatives presented in the Final CMS/FS that would physically impact Woman Creek corridors.

Comment 3:

Section 4.3, page 4-17 - The Phase III RFI/RI "suggests the presence of mobile or immobile (residual) DNAPL" and further states that "DNAPL would be expected within the drum storage area and in the vicinity of the high detections of VOCs in soil gas." This assessment has not been adequately presented under the assumptions used in performing the detailed analysis of alternatives.

Comment 4:

Section 4.3, Table 4-1 - Alternative 1 is not actively treating the primary source while Alternatives 2-5 do attempt to treat the source and in doing so, utilize the French Drain. The Division is unclear why the predicted peak concentration values from the model for Alternative 1 are lower than the concentrations predicted for Alternatives 2-5.

Section 4.3.1 Alternative 0: No Action

Comment 5:

Section 4.3.1.1, page 4-22 - The Final CMS/FS states, "There are conditions that can exist, however, that allow the byproduct or endproduct of a degradation process to be more hazardous to the environment and

human health than the original contaminant." Please identify those conditions as they relate to OU1.

Comment 6:

Section 4.3.1.2, page 4-23 - This section states that corrective action would only include monitoring for as long as necessary to achieve the groundwater standards at the selected point of compliance. This section should identify the time frame for compliance with ARARs. In order to accurately represent and evaluate this alternative, the ARARs and their designated POC must be identified, including the potential need for an ARAR waiver. This comment is applicable for all the alternatives presented in the Final CMS/FS.

Comment 7:

Section 4.3.1.3, page 4-24 & 4-30 - For both alternatives 0 and 1, the text states that the period for groundwater monitoring is 30 years. This section fails to identify that, based on the model, neither of these alternatives will meet ARARs at their designated POCs within 30 years. Based on previous groundwater modeling, 300 to 400 years would likely be required before the natural degradation and attenuation process for the contaminants would meet ARARs at the French Drain.

Comment 8:

Section 4.3.1.5, page 4-25 - What are the existing health and safety procedures at the site that offer protection for workers and visitors? This section should identify what procedures exist and are necessary to protect workers and visitors.

Section 4.3.2 Alternative 1: Institutional Controls with the French Drain

Comment 9:

This section should identify the potential for the French Drain not to capture all groundwater contaminants upgradient of Woman Creek, as stated in Section 1, page 1-27, "the eastern portion of OU1, where the French Drain does not extend, the potential for contaminant migration to Woman Creek exists."

Comment 10:

Section 4.3.2.1, page 4-27 - The text states that Alternative 1 will be protective assuming the site is not abandoned during the institutional control period. An assumption of this magnitude is not appropriate. If Alternative 1 is the alternative selected, the CAD/ROD must ensure institutional controls throughout the time period necessary for Alternative 1 to meet ARARs.

Comment 11:

Section 4.3.2.1, page 4-27 - The text states, "TCE concentrations at the French Drain do not meet the groundwater PRGs during the modeling time frame and may not meet them until the source of contamination is depleted." In other words, the French Drain cannot be shut-down until the upgradient subsurface soil contamination is sufficiently depleted. On page 4-32 the text states, "Alternative 1 does not actively remediate the primary source of contamination." Therefore, Alternative 1 is totally dependant on the time required for sufficient source depletion via natural attenuation and degradation. Assuming these two statements are valid, this section must specify the predicted or estimated time frame for source depletion in order for this alternative to meet groundwater PRGs.

Comment 12:

Section 4.3.2.2, page 4-28 - Please define what "in all probability" means. Has RFETS performed some type of statistical calculation to show "in all probability" is valid or is "in all probability" based on engineering judgement that may contradict or qualify the model? Again, the Final CMS/FS must be detailed enough to select a remedy with certainty.

Alternative 2: Groundwater Pumping and Soil Vapor Extraction

Comment 13:

Section 4.3.3.2, page 4-38 - Much of the text in this section states that Alternative 2 should comply with ARARs. This is unacceptable, if the alternative cannot meet ARARs then in order for the remedial alternative to be selected then those ARARs must be waived. "Should comply with ARARs" implies that RFETS representatives are either unfamiliar with the ARARs or the alternative is not detailed enough to be certain which ARARs cannot be met for OU1.

Comment 14:

Section 4.3.3.6, page 4-41 - The text states, "An SVE treatability study at OU2 has been discontinued with a recommendation to not use SVE at the site." Please identify what this recommendation includes and how it compares with the conditions and contaminants at OU1. Do the results of this treatability study recommend not to use SVE at the entire Rocky Flats Plant? A separate treatability study for soils at OU1 would be very helpful in determining the effectiveness of this alternative.

Alternative 3: Groundwater Pumping and SVE with Thermal Enhancement

Comment 15:

Section 4.3.4.1, page 4-43 - Both Alternatives 2 and 3 require 10 years of French Drain operation after implementation before chemical specific ARARs (TCE standards) are met. What value does thermal enhancement provide other than potentially a higher degree of permanence? Based on the information presented in the text regarding Alternatives 2 and 3 there is little benefit to evaluating Alternative 3. Again, a separate treatability study for soils at OU1 would be very helpful in determining the effectiveness of this alternative.

Comment 16:

Section 4.3.4.2, page 4-45 - The text states that a RCRA performance monitoring system would probably be needed for 10 years after remediation based on the modeling results. The model assumes complete source removal after remediation which for Alternatives 2 and 3 are highly unlikely. Is 10 years appropriate and if so, the basis for this decision must be identified in this section. A similar basis should be identified for the additional 3 years of groundwater monitoring the modeling proposed after the French Drain has been shut-down.

Alternative 4: Hot Air Injection with Mechanical Mixing

Comment 17:

Section 4.3.5.1, page 4-52 - The text states that due to the high soil temperatures, the hot air injection may have an adverse effect on the soil at OU1. What temperatures is RFETS proposing for this alternative? Has this treatment technology been utilized with soils similar to OU1 at other facilities? Has DOE discussed the potential for a treatability study for this alternative to evaluate its effectiveness?

Alternative 5: Soil Excavation with Groundwater Pumping

Comment 18:

Section 4.3.6.2, page 4-63 - The text states that the delisting process can require 2 years of agency review and approval. The Division recommends development of action levels dependant upon the concentrations remaining in the soil after treatment. The Division is confident after the subsurface soil is effectively treated using a low temperature thermal desorption unit that the sampling results should show non-detect values for the OU1 organic contaminants. The "delisting" requirement would be immediate for those soils at or below non-detect. For the treated soils with contaminants above non-detect, the action levels previously developed by all three parties would identify the management options. Further discussion with both EPA and RFETS representatives is necessary to determine the feasibility of this concept.

Comment 19:

Section 4.3.6.3, page 4-65 - The Division disagrees with DOE's statement that uncertainties regarding the nature and extent of the DNAPL sources may limit the degree of permanence achieved by this alternative. The data collected during development of the Phase III RFI/RI clearly identifies an area within IHSS 119.1 as a suspected DNAPL source. If RFETS' proposal to excavate and treat 17,500 cubic yards of soil is not adequate to ensure complete DNAPL removal then the text for Alternative 5 must clearly identify what parts of the DNAPL would not be treated.

Comment 20:

Section 4.3.6.5, page 4-67 - Management of the soil must comply with Part 100 and potentially Part 265 of the Colorado Hazardous Waste Regulations depending on how the soil is managed prior to treatment.

Comment 21:

Section 4.3.6.5, page 4-67 - What off-site receptors from fugitive dust is the text referring to under the short-term effectiveness concerns. If this from excavation, treatment, transportation, or a combination of each? DOE's current procedures to cease operations during high wind periods would surely prevent fugitive dust exposure to off-site receptors during excavation and/or treatment.

Comparative Analysis

Comment 22:

Section 4.4.1, page 4-69 - The Division disagrees that overall protection of human health and the environment is highest with Alternative 1. Alternative 1 only functions as containment and is a passive system which does not even attempt to treat the suspected DNAPL source. Alternatives 2-5 not only utilize the French Drain but also attempt to treat the DNAPL. Other than some potential short-term soil disturbances, Alternatives 2-5 would all be more protective to human health and the environment. How does DOE justify leaving the contaminated subsurface soils in place, likely requiring much greater than 30 years (possibly 300-400 years), as the most protective alternative? Enhancement of Alternatives 2-5 would not only be more effective than Alternative 1 in controlling and treating the source but would likely be much more cost effective in the long run. Further discussion regarding enhancing Alternatives 2-5 is warranted in order to more effectively determine the exact location of the contamination and treat the suspected DNAPL source.

Comment 23:

Table 4-2 - Under the section "Ability to meet ARARs" each alternative includes language identifying the potential for TCE to exceed ARARs at the French Drain based on transport modeling. This statement could potentially lead an observer to one of two conclusions. Either that none of the alternatives presented in this CMS/FS are sufficient to comply with the ARARs for TCE or that the transport model is inaccurate and of little use for selecting a remedy. DOE should clarify this statement regarding TCE and rank each of the alternatives abilities to comply with TCE ARARs at the French Drain.

Comment 24:

Section 4.4.1, page 4-73 - It is true that Alternative 5 would likely have the greatest short-term adverse effects in terms of disturbance to the environment. Decontamination versus disturbance, however, should also be included in the text. Other alternatives may not create as great of a disturbance but the other alternatives will not treat the contamination as effectively, if at all.

Comment 25:

Section 4.4.1, page 4-74 - The Division disagrees that Alternative 1 is currently meeting the RAOs for the site. In particular for RAO #2 which reads, "Prevent migration of contaminants from subsurface soils to groundwater that would result in groundwater contamination in excess of potential groundwater ARARs

for OU-1 contaminants." The text has previously acknowledged that Alternative 1 does not actively remediate the primary source of contamination. Alternative 1 is only treating the groundwater contaminated as a result of the upgradient source. Operating the French Drain does not prevent migration of contaminants from subsurface soils to groundwater upgradient of the French Drain. Again, Alternative 1 is dependant on the natural attenuation and degradation process of the DNAPL.

Comment 26:

Section 4.4.1, page 4-74 - The text fails to identify a remediation time period for Alternative 0. Isn't is true that previous groundwater modeling runs indicated 300 to 400 years until the groundwater would meet ARARs at the French Drain? This information is critical, especially as it relates to Alternative 1. The French Drain could not be shut down until the natural attenuation and degradation process effectively depletes the source.

Comment 27:

Section 4.4.2, page 4-74 - The text states, "It is possible that the predicted peak concentrations are over estimated and that Alternatives 1-5 or some of these alternatives would not exceed the state groundwater standards." Is this possibility a result of an over conservative model, inaccuracies in the model, or an engineering judgement? Please qualify this possibility.

Comment 28:

Section 4.4.2, page 4-76 - The text states that Alternative 1 may require 16 years of monitoring. The State Basic Standards for Groundwater for both TCE and PCE is 5 ug/l. Figure B-59 and B-57 present TCE and PCE levels of approximately 100 ug/l and .2 ug/l, respectively after 16 years. However, if the French Drain is decommissioned after 16 years, the levels would increase to nearly their original values based on Figures B-49 and B-47. Assuming the model is accurate, Figures B-49 and B-47 show very little decrease in TCE and PCE levels after 35 years which is as far as the model predicted. Therefore, how can 16 years of operation of the French Drain and monitoring be an accurate estimate? Based on what information was this time period determined and as a result, how accurate are the remediation time period estimates for all of the alternatives presented?

Appendix A: Alternative Cost Analysis

Comment 1:

The most cost effective alternative that satisfies ARARs would likely be selected as the preferred alternative. The cost analysis must be as accurate and complete as possible. It is therefore imperative that each alternative be represented in the most cost-effective manner, including what assumptions significantly impact the alternative's cost.

As previously presented in the Final CMS/FS, the alternative that satisfies the CERCLA requirements in the most cost effective manner is selected as the preferred alternative. Why then is Alternative 1 the preferred alternative presented in the Proposed Plan for OU1? Aren't Alternatives 2-4 all more cost effective then Alternative 1?

Comment 2:

Alternatives 1-5 - Previously in Section 4.0 of the Final CMS/FS, the text mentioned the possibility of transferring the OU2 GAC unit to OU1. If this transfer is completed, where will the OU2 water currently being treated be sent and how will this impact the annual approximate $250,000/year OU1 cost for operating the 891 treatment system? If this scenario is likely, the OU1 cost for operating the 891 Treatment System should be modified appropriately.

Comment 3:

Alternative 5 - After treating the soil using the low temperature thermal desorption unit, how will the cost be impacted if the soil is then placed back into its original location?

Comment 4:

Alternative 5 - Separate discussions with RFETS representatives independent of OU1 have been on-going regarding a full-scale low temperature thermal desorption (LTTD) unit at RFETS. Full-scale operations could be available in less than 5 years. An on-site LTTD unit capable of treating contaminated soil could dramatically decrease the potential costs incurred by OU1 for soil treatment. Are OU1 representatives aware of the potential for an on-site LTTD at RFETS and have they discussed the potential impact to OU1 both in terms of cost savings and treatment options. The Division is aware that a 5 year time frame may not be appropriate, however, RFETS representatives must consider all potentially available information and technologies in order to produce an accurate Final CMS/FS.

Appendix B: Groundwater Modeling Results

General Comments

The current model is much improved from the first version that was submitted to the Division. Inclusion of the sensitivity analysis for specific parameters allows quantification of the effect of those parameters. With appropriate qualifiers and sound engineering judgement the model can be used to estimate contaminant concentrations and evaluate remedial alternatives. The primary qualifiers being:

- TCE is overestimated, we have no evidence that it reached the French Drain before it was built. This is not bad but it does make it difficult to estimate how long the French Drain needs to operate.
- CCl_4 is poorly estimated. This could be because of a different source location, but it raises questions on the necessary length of french drain operations.
- The true source terms are not fully known.
- This is a theoretical pathway and may be shorter, longer, or have different properties than the actual pathways.

The No-Action Alternative gives an estimate of what is going into the French Drain rather than the simulated water quality below the drain. This is the deciding factor for how long to operate the drain under institutional controls. It appears that PCE could be as high as 10 ug/L in 2030, TCE could be 1000 ug/L and CCl_4 could be 1.8 ug/L. 1,1,1-TCA and 1,1-DCE appear to have dropped below standards. Monitoring needs to occur in suspected groundwater pathways above the French Drain. Uncertainty in the source term is the key factor in the length of time the French Drain needs to operate.

Specific Comments:

Page B-11: Discussion of the flow calibration indicates there may be some heterogeneity within the colluvium or that the conductivity of the valley fill could have been a little higher. The sensitivity analysis shows this will not make a significant change in the modeled results for the purpose of this study.

Page B-12: Discussion of convergence for subdomains within the model raises the question as to which area in the OU1 model is not an area of interest.

Page B-13: Discussion of transport calibration- While it is appropriate for a model to be conservative,

if it becomes so conservative no one believes it, it is no longer useful.

Page B-16: Is 0.0144 cf/day a typographical error? Adding this comparison of flows is a good improvement to the model documentation.

Page B-18: Density difference discussion - The Division believes the requested comparison was for TCE concentrations in the observed data. Using this formula a concentration of 10,000 ug/L TCE would be at the 1% density difference. Perhaps this is one explanation for the poorer calibration to TCE data.

Appendix C: Residual Risk Calculations

General Comments

DOE has inadequately assessed the potential noncarcinogenic inhalation toxicity of the carcinogens, carbon tetrachloride, PCE, and 1,1,-DCE. The Baseline Risk Assessment (BRA) for OU1 showed that inhalation of vapors derived from groundwater that have seeped into basements or that result from groundwater use were major complete pathways. The DOE has acknowledged this on page 3-2 of this CMS/FS document. In the BRA, these two pathways accounted for a significant portion of the total carcinogenic risks from these three chemicals. A major deficiency in DOE's evaluation is that it did not quantitatively evaluate the potential for noncarcinogenic health effects from these chemicals in either the BRA or in the CMS/FS. The only evaluation in the CMS/FS is a qualitative statement in the Uncertainty Assessment that states that a lack of RfDs or RfCs may result in an underestimation of risk.

The Guidance for residual risk assessment does not specifically address this problem, though Part C RAGS does state, "At a minimum, those chemicals that contribute to major portions of the site risk should be selected for measuring attainment". However, RAGs Part A (page 7-15) states, "RfDs should be sought for all chemicals carried through the risk assessment, including carcinogens". In addition, RAGS recommends (Part A, page 7-16) that "For cases in which EPA-derived toxicity values are not available for the route of exposure being considered but are available for another route, EPA recommends contacting ECAO for guidance on route-to-route extrapolation. If toxicity information is not available from ECAO, a qualitative, rather than quantitative evaluation of the chemical is recommended. The implications of the absence of this chemical from the risk estimate should be discussed in the uncertainty section".

Based on conversations with ECAO, provisional RfC (inhalation RfD) values are available for CCl_4 and for PCE. Therefore, at least these two chemicals could be evaluated quantitatively. DOE does not seem

to have made an effort to obtain these values, or at least have not documented that effort in this CMS/FS document. ECAO does not have a provisional inhalation toxicity value for 1,1-DCE. Therefore, only a qualitative assessment of the potential for this chemical to cause noncarcinogenic, systemic toxicity is possible. The toxicity assessment for this chemical in the CMS/FS is adequate.

However, a more quantitative assessment for the potential of carbon tetrachloride and PCE to cause systemic toxicity by the inhalation route is possible. This quantitative evaluation should be included in the assessment of residual risk as well as in the baseline risk assessment. Two of the factors which DOE listed in the Uncertainty Assessment as potentially underestimating residual risk could have been addressed by inclusion of this information.

Table C.3-1 in the Final CMS/FS document as compared to Table F5-28 in BRA document - It was not clear why the indoor air volatiles concentrations of PCE, CCl_4, 1,1-DCE, and 1,1,1-TCA modeled for the two pathways by the Johnson and Ettinger model and by the Andelman method were fairly similar in the BRA, but differed by 4 or 5 orders of magnitude in the final CMS/FS. Are we sure the modeled concentrations derived using these two models in both the BRA and in the CMS/FS are correct? Please provide some rationale for this apparent discrepancy.

Appendix D: Potential ARARs

General Comments

The administrative transfer of surface water from OU1 to OU5 (Woman Creek) includes all surface water contaminants and requirements. Therefore, all ARARs regarding surface water in OU1 will be identified under OU5 with the exception of the 891 treatment system effluent standards. The existing 891 treatment system discharges treated OU1 water to the Woman Creek C-2 Pond via the South Interceptor Ditch (SID) as surface water. The effluent water from 891 to the SID must therefore meet the site specific surface water standards. After a brief review, it appears that CCl_4, 1,2-DCA, PCE, TCE, and 1,1,2-TCA may have basic or site-specific surface water standards lower than the existing effluent requirements for the 891 treatment system. Based on the existing 891 treatment technology, converting the effluent standards to the site-specific standards should not be a problem with the possible exception of CCl_4. Addition of the OU2 GAC unit to the 891 treatment system would likely resolve this concern.

6CCR 1007-1, Part 4: Rules and Regulations Pertaining to Radiation Control was not included in the list of potential ARARs, specifically Section 4.60.1: Permissible Levels of Radioactive Material in Uncontrolled Areas. IHSS 130 contains contaminated soil in excess of 0.9 pCi/g of Plutonium per gram of dry soil. Control techniques must be identified in the Final CMS/FS for IHSS 130 to prevent future construction resulting in hazards to public health and the environment.